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## **Psychometric properties of the Iranian version of the premature ejaculation diagnostic tool**

Pakpour, Amir H ; Yekaninejad, Mir Saeed ; Nikoobakht, Mohammad Reza ; Burri, Andrea ; Fridlund, Bengt

**Abstract:** **INTRODUCTION:** Premature ejaculation (PE) is one of the most prevalent male sexual problems. The Premature Ejaculation Diagnostic Tool (PEDT) is a suitable patient-reported outcome measure for the assessment of PE. **AIM:** To examine the psychometric properties of a translated and culturally adapted version of the PEDT in a sample of Iranian men suffering from PE. **METHODS:** Two independent samples were compared, one including patients with PE based on the DSM-IV-TR criteria ( $n = 269$ ) and the other including healthy men without PE ( $n = 289$ ). A backward-forward translation procedure was used to translate the PEDT into Persian. Both samples were asked to fill in the PEDT twice-at baseline and 4 weeks later. **MAIN OUTCOME MEASURES:** Internal consistency, test-retest reliability, convergent validity, factor structure, measurement invariance across sexual health status (i.e., between men with and without PE). **RESULTS:** Mean ages of men without and with PE were 34.9 and 35.3 years, respectively. Cronbach's alpha coefficient for the total PEDT score was 0.89. All items and the total score were remarkably consistent between the two measurement points. All five PEDT items correlated at  $r = 0.40$  or greater with their own scale, indicating good convergent validity. There was a high and significant correlation ( $r = -0.82$ ,  $P < 0.001$ ) between the PEDT score and IELT. Healthy men reported lower scores (fewer complaints) on the PEDT compared with the PE group. A single-factor model was found to be best-fitting in the exploratory factor analysis; this was confirmed by confirmatory factor analysis. The PEDT was invariant across sexual health status and perceived similarly by men with and without PE. **CONCLUSION:** The results provide evidence for good reliability and validity of the Iranian version of the PEDT. The questionnaire therefore represents a suitable tool for screening PE in Iranian men. Pakpour AH, Yekaninejad MS, Nikoobakht MR, Burri A, and Fridlund B. Psychometric properties of the Iranian version of the Premature Ejaculation Diagnostic Tool. Sex Med 2014;2:31-40.

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## ORIGINAL RESEARCH—EJACULATORY DISORDERS

## Psychometric Properties of the Iranian Version of the Premature Ejaculation Diagnostic Tool

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## ABSTRACT

**Introduction.** Premature ejaculation (PE) is one of the most prevalent male sexual problems. The Premature Ejaculation Diagnostic Tool (PEDT) is a suitable patient-reported outcome measure for the assessment of PE.

**Aim.** To examine the psychometric properties of a translated and culturally adapted version of the PEDT in a sample of Iranian men suffering from PE.

**Methods.** Two independent samples were compared, one including patients with PE based on the DSM-IV-TR criteria ( $n = 269$ ) and the other including healthy men without PE ( $n = 289$ ). A backward–forward translation procedure was used to translate the PEDT into Persian. Both samples were asked to fill in the PEDT twice—at baseline and 4 weeks later.

**Main Outcome Measures.** Internal consistency, test–retest reliability, convergent validity, factor structure, measurement invariance across sexual health status (i.e., between men with and without PE).

**Results.** Mean ages of men without and with PE were 34.9 and 35.3 years, respectively. Cronbach's alpha coefficient for the total PEDT score was 0.89. All items and the total score were remarkably consistent between the two measurement points. All five PEDT items correlated at  $r = 0.40$  or greater with their own scale, indicating good convergent validity. There was a high and significant correlation ( $r = -0.82$ ,  $P < 0.001$ ) between the PEDT score and IELT. Healthy men reported lower scores (fewer complaints) on the PEDT compared with the PE group. A single-factor model was found to be best-fitting in the exploratory factor analysis; this was confirmed by confirmatory factor analysis. The PEDT was invariant across sexual health status and perceived similarly by men with and without PE.

**Conclusion.** The results provide evidence for good reliability and validity of the Iranian version of the PEDT. The questionnaire therefore represents a suitable tool for screening PE in Iranian men. **Pakpour AH, Yekaninejad MS, Nikoobakht MR, Burri A, and Fridlund B. Psychometric properties of the Iranian version of the Premature Ejaculation Diagnostic Tool. Sex Med 2014;2:31–40.**

**Key Words.** PEDT; Premature Ejaculation; Diagnostic Tool; Intravaginal Ejaculatory Latency Time; Iran; Psychometric Validation

## Introduction

Sexual problems are prevalent across the general population, and it is estimated that up to 50%

of sexually active people suffer from some type of sexual problem at least at one point in their lives [1]. The three major categories of male sexual dysfunction are ejaculatory dysfunction (such as premature

ejaculation, PE), erectile dysfunction (ED), and hypoactive sexual desire disorder. Epidemiologic studies suggest that PE is the most prevalent sexual problem in men [2,3] with prevalence estimates ranging from 10% up to 40% [4–7]. However, survey findings vary considerably due to the use of inconsistent definitions of sexual problems and the application of different assessment methods.

Various definitions of PE exist, and a universally accepted definition of PE has yet to be established. According to the International Society for Sexual Medicine, PE is defined as “a male sexual dysfunction characterized by ejaculation which always or nearly always occurs prior to or within about one minute of vaginal penetration; and, inability to delay ejaculation on all or nearly all vaginal penetrations; and, negative personal consequences, such as distress, bother, frustration and/or the avoidance of sexual intimacy” [8]. The *Diagnostic and Statistical Manual of Mental Disorders* (4th edition, text revision; DSM-IV-TR), in contrast, emphasizes the emotional and interpersonal impact of ejaculation in the definition of PE, describing it as “a persistent or recurrent ejaculation with minimal sexual stimulation before, on, or shortly after penetration and before the person wishes it and [that] causes marked distress or interpersonal difficulty and is not due to the direct effects of a substance.” PE can be subclassified into a primary type (lifelong) that starts when a man first becomes sexually active and a secondary type that develops later in life in a man who previously had an acceptable level of ejaculatory control. Despite considerable research advances, the etiology of PE is still not fully understood [9]. Research advances are often hindered by the reluctance of patients to discuss their condition with their physicians [10,11]. Most likely, a combination of physical and psychological factors contribute to the development of PE. The factors so far identified as associated with PE are many and include age, lifestyle [12], distress [13], and medical and psychological comorbidities such as depression [14], anxiety [14,15], social phobia [16], diabetes [17], prostate diseases [18,19], and ED [20].

PE causes substantial suffering and disability in daily living. It not only impacts on the psychological health of individuals (e.g., self-confidence, tension, guilt, fear) but also affects relationship satisfaction and therefore overall quality of life. PE is usually diagnosed via medical examination and by assessing anamnestic information on the patient's sexual history. Additionally, several questionnaires based on patient-reported outcome

(PRO) exist, allowing the subjective assessment of PE and the monitoring of treatment outcomes. Although there are also objective measures available for the assessment of ejaculatory function, such as intravaginal ejaculation latency time (IELT; defined as the time between the start of vaginal intromission and the start of intravaginal ejaculation), they do not provide any information about changes in confidence and satisfaction of participants regarding their sexual function, which represent an important indicator of sexual well-being [21,22]. Consequently, there is a high demand for simple instruments assessing PRO, whereby patients' own perceptions and ratings of their health and sexual status are the focus, and outcomes do not need to be subjectively interpreted by physicians or health-care professionals.

Today, one of the most widely used and extensively validated self-report questionnaires in PE clinical and research practice is the Premature Ejaculation Diagnostic Tool (PEDT) [23]. The PEDT was developed on the basis of the DSM-IV-TR criteria for the diagnosis of PE [24]. Given that evidence points toward a cultural component in the perception of PE, availability of translated versions of the PEDT that can be applied to other communities and ethnicities may help foster our understanding of PE and patients' perception of PE [25,26]. To date, however, no Persian version of the PEDT for the assessment of PE in Iranian populations exists. Therefore, the aim of the present study was to translate and culturally validate the PEDT in a sample of Iranian men with and without a clinical diagnosis of PE.

## Methods

Data collection took place from March 2012 to July 2012. Two independent samples were included in this study. Using a convenience sampling approach, patients with a DSM-IV-TR diagnosis of PE were consecutively selected from 10 urology clinics across Tehran, Iran, and included in the first sample (i.e., the case sample) [27]. Inclusion criteria were as follows: being older than 18 years; being in a stable sexual relationship with a female partner for at least 6 months; a clinical diagnosis of PE; consenting to participate in the study. Individuals suffering from ED as assessed by the International Index of Erectile Function (IIEF-15) [28,29], taking medications for the treatment of sexual problems (such as phosphodiesterase inhibitors), and suffering from depression (as assessed by the Depression Anxiety Stress Scale, DASS) or from cardiovascular dis-

eases, hypertension, and/or diabetes were excluded from the study [30]. Patients were further asked to complete the DASS and the IIEF for the screening of depression and ED. In the end, a total of 269 men were eligible to participate and be included in the “case” sample.

Individuals for the control sample were recruited across three randomly selected health centers across Tehran. These health centers were affiliated with either Shahid Beheshti University of Medical Sciences or Tehran University of Medical Sciences. A multistage cluster random-sampling method was used to recruit healthy men. All individuals visiting these health centers have health records with detailed information regarding their health status. From these health centers, 150 files were randomly selected, and men older than 18 years who had been in a stable sexual relationship with a female partner for at least 6 months were invited to participate in the study. The same inclusion and exclusion criteria as in the case sample applied, except for the clinical PE diagnosis. All individuals eligible to be included in the control sample were further examined by a urologist to ensure that they were not suffering from PE and/or ED. In the end, a total of 303 men were included in the control sample. Written consent was obtained from every individual before enrollment in this study. The project was approved by the Ethics Committee of Qazvin University of Medical Sciences.

### Measures

A self-constructed questionnaire was used to collect information on demographic characteristics of the participants, such as age, marriage/relationship duration, weight, height, educational status, family income, and current smoking status.

### PEDT

For the assessment of PE status, the PEDT was used. This five-item questionnaire was developed according to the DSM-IV-TR criteria used to diagnose PE [31]. The questionnaire covers the following five domains: ejaculation control, frequency of PE, ejaculation with minimal sexual stimulation, distress, and interpersonal difficulty. Response options for all items are on a five-point Likert-type scale ranging from 0 to 4, with higher scores indicating more sexual impairment. The total score is computed by summing up all item scores. The following, previously suggested classification was applied: “no PE” (scores  $\leq 8$ ), “probable PE” (scores 9–10), and “PE” (scores  $\geq 11$ ) [31,32]. The PEDT can be used in clinical practice

as a standardized short scale to screen people for PE based on different aspects relevant to the condition, such as frequency of PE events, perceived control, and personal distress associated with ejaculation, along with interpersonal difficulties and ejaculation with minimal sexual stimulation [26,31]. The scale may further be used for research purposes to differentiate between patients and healthy controls or to monitor treatment outcomes in clinical trials [32]. The psychometric properties of the PEDT were confirmed in the original validation study conducted by Symonds et al. [31]. Furthermore, a number of validation studies conducted in the United States and across Europe have provided consistent support for the validity and reliability of the measure [26,31,32].

### IELT

To objectively complement the subjective assessment of PE, participants were asked to record IELT by using a stopwatch to measure the time between vaginal intromission and start of ejaculation [23].

### DASS-21

The 21-item DASS-21 was used to screen patients for symptoms of depression, stress, and anxiety [33]. Each of the three dimensions consists of seven items, rated on a Likert-type scale ranging from 0 to 3. Higher scores indicate more symptoms of depression, anxiety, or stress. Scores greater than 4, 3, and 7, respectively, indicate pathological levels of depression, anxiety, and stress. The DASS-21 has been widely used and extensively validated [33].

### Procedure

All individuals consenting to participate in this study and meeting the inclusion criteria ( $n = 269$  cases,  $n = 289$  controls) were provided with detailed information on the study procedure and aims by a nurse and were given the PEDT on site for baseline assessment. Next, the participants' wives were trained by the nurses in how to use the stopwatch and were asked to record IELT for each sexual intercourse during a period of 4 weeks. After the 4 weeks, male participants were asked to complete the PEDT for the second time for the follow-up assessment.

### Translation Procedure

The translation procedure (English to Persian) was performed according to the widely accepted recommendations of Brislin et al. [34–37]. First, the original English version of the PEDT was independently translated into Persian by two



bilingual translators whose native language was English. Second, the two translators and the project manager compared the translations and reconciled any discrepancies to produce a unified Persian version. Next, a panel of experts assessed the interim version of the PEDT in terms of face validity and content validity. This preliminary Persian version of the PEDT was then back-translated into English by two different native English-speaking bilingual translators. Then, the resulting questionnaire was again compared with the original English PEDT version. In a final step, the preliminary Persian version of the PEDT was piloted in 28 Iranian patients with PE to ensure the comprehensiveness of the introduction and questionnaire items.

### Statistical Analysis

Internal consistency and test–retest reliability were used to examine the reliability of the PEDT. Cronbach's alpha coefficient ( $\alpha$ ) was computed to assess the internal consistency of the translated questionnaire. Values  $\geq 0.70$  were considered acceptable [38]. The reproducibility of the PEDT was examined using a test–retest method based on two different measurement points (i.e., baseline and four weeks later). Intraclass correlation coefficients (ICCs)  $\geq 0.70$  were considered satisfactory [38]. The ICCs were computed using a one-way analysis of variance with patients as the random factor [39].

Convergent validity was examined using one-trait scaling analysis. In this procedure, the correlations between each questionnaire item and the total questionnaire score are generated. Spearman correlation coefficients were computed to assess convergent validity. Convergent validity was assumed if all of the questionnaire items showed correlation at  $r > 0.40$  with the total score for their own scale [40]. Additionally, Spearman correlation coefficients between the PEDT and IELT outcomes were computed to further support the convergent validity of the PEDT scale.

The discriminant validity of the PEDT was assessed by known-groups validation. In this procedure, differences between item scores were examined in terms of the presence or absence of PE among cases and healthy controls. We hypothesized that men with PE would report higher scores (i.e., more impairment) across the PEDT items in comparison with the controls [24]. A nonparametric Mann–Whitney *U*-test was used to compare the mean PEDT ranked-response item scores between the case and the control group. All

*P* values were adjusted for multiple comparison using the Benjamini–Hochberg procedure [41].

The sensitivity and specificity of the PEDT scores were examined using receiver operating characteristics (ROC). The area under the curve (AUC) was used to assess the ability of the PEDT to differentiate between healthy individuals and individuals with PE. According to Greiner et al., AUC values  $< 0.5$ ,  $0.5$ – $0.7$ ,  $0.9$ – $0.99$ , and  $1$  are nonpredictive, less predictive, moderately predictive, highly predictive, and perfectly predictive, respectively [42].

The factor structure of the PEDT was assessed using exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). Because of the ordinal nature of the data (i.e., Likert-type ratings), both EFA and CFA were performed in an ordinal manner. In the case sample, ordinal EFA was performed using LISREL 8.80 [43]. A Kaiser–Meyer–Olkin (KMO) value  $> 0.70$ , a significant Bartlett's test of sphericity, and eigenvalues  $> 1$  were considered to indicate the best fit for the questionnaire items included in the factor analysis. Furthermore, varimax rotation was used to rotate the axes such that the eigenvectors remained orthogonal and that the different factors remained uncorrelated while being rotated.

CFA using the weighted least-squares method was conducted to compare the hypothesized factor structure with the observed data. In addition, an asymptomatic covariance matrix was computed [44]. Various well-established model fit indices were considered to assess the model fit:  $\chi^2$ -test, root mean square error of approximation (RMSEA), goodness-of-fit index (GFI), adjusted GFI (AGFI), comparative fit index (CFI), normed fit index (NFI), standardized root mean square residual (SRMR), and  $\chi^2/\text{df}$  ratio. An RMSEA  $< 0.080$  indicates an acceptable fit. GFI, AGFI, and CFI values  $> 0.90$  were considered acceptable. A SRMR  $< 0.08$  indicates an adequate fit [44]. A  $\chi^2/\text{df}$  ratio  $< 5$  was regarded a reasonably good fit.

To assess factorial invariance among men with and without PE, a multigroup CFA was performed. Horn and McArdle introduced two hierarchical levels of factorial invariance [45]. The first level deals with configural invariance and assumes that the factor structure and model specifications are equal across groups. It is used to ensure that individuals in each group use the same conceptual framework to answer the questions. The main assumption of configural invariance is that the number of factors and the pattern of salient factor loadings are constrained to be equal while the

**Table 1** Sample characteristics for men with and without PE

Characteristic	Healthy control (n = 289)	Men with PE (n = 269)
Age, mean (SD)	34.99 (7.45)	35.36 (7.55)
Duration of marriage (yrs), mean (SD)	8.30 (7.67)	7.02 (7.59)
Height, mean (SD)	167.95 (8.18)	178.51 (10.08)
Weight, mean (SD)	73.83 (9.85)	79.4 (11.12)
Education, n (%)		
Unlettered	8 (2.8)	13 (4.8)
Primary school	63 (21.8)	55 (20.4)
Secondary school	123 (42.6)	119 (44.2)
College or higher	95 (32.9)	82 (30.5)
Family income (US\$), n (%)		
<200	88 (30.4)	79 (29.4)
200–1,000	179 (61.9)	157 (58.4)
>1,000	22 (7.6)	33 (12.3)
Current smoker, n (%)		
Yes	80 (27.7)	86 (32.0)
No	209 (72.3)	183 (68.0)

magnitudes of these loadings are not [45]. In the second level, the equality of factor loadings across groups is tested (i.e., metric invariance). The  $\chi^2$ -test and changes in CFI were used to assess the relative fit of the nested measurement equivalence models. It has to be noted that the  $\chi^2$ -test is relatively sensitive to sample size; therefore, Cheung and Rensvold recommended also using the difference in CFI values ( $\Delta$ CFI) for nested models [46]. CFI value differences  $\leq 0.01$  between the nested models were considered to be acceptable and indicated model invariance [46].

## Results

Sample characteristics are listed in Table 1. Approximately 5% ( $n = 14$ ) of healthy men did not participate in the study due to unwillingness. The mean ages of men with and without PE were 35.3 years and 34.9 years, respectively. In terms of family income, the majority of participants reported a monthly income between US\$200 and US\$1,000. Most of the subjects were nonsmokers (70%). No statistically significant differences in sociodemographic characteristics between men with and without a clinical diagnosis of PE could be detected.

### Scale Reliability

Cronbach's alpha coefficient for the PEDT was 0.89. Test-retest reliability was good, with all single items and the total score being consistent between the two measurement points and being significantly correlated ( $P < 0.05$ ). The test-retest

correlation coefficients of each item for both patient and control groups were higher than 0.81, and the correlation coefficients for the total score were 0.92 and 0.94 for the patient and control groups, respectively.

Results from the one-trait scaling analysis carried out to examine the convergent validity of the PEDT are shown in Table 2. All five questionnaire items correlated at  $r = 0.40$  or greater with the total score. All correlations were based on the corrected item-to-total correlations.

Convergent validity of the PEDT was good, with a high negative linear correlation ( $r = -0.82$ ,  $P < 0.001$ ) between the questionnaire and the IELT (Figure 1). In other words, with increasing PEDT total score, the geometric mean IELT declined. Results of the discriminant analysis are summarized in Table 3. As expected, subjects with PE reported higher PEDT scores compared with subjects without PE.

The ROC curve showed a large and statistically significant AUC of 0.89 (95% CI 0.87–0.90) for discrimination between cases and controls. A score of 9.1 was considered the best cutoff to discriminate between healthy men and men with PE as defined by the DSM-IV-TR, resulting in a sensitivity of 92% and a specificity of 83% (Figure 2). The positive predictive value of the test was 0.83.

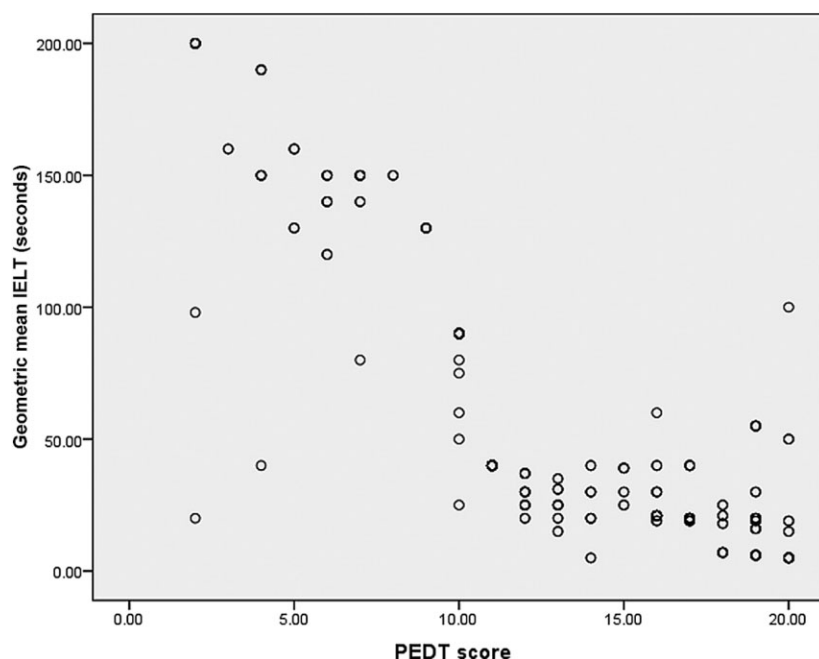
Findings from the EFA indicated that a single-factor structure provided the best fit to the data, with eigenvalues of  $>1.0$  (KMO = 0.70) and a significant Bartlett's test of sphericity ( $\chi^2 = 57.72_{(10)}$ ,  $P < 0.001$ ). All items showed considerable factor loadings, ranging from 0.70 to 0.83. According to the CFA goodness-of-fit measures, the unidimensional PEDT was acceptable, with  $\chi^2 = 12.86$  ( $df = 5$ ,  $P = 0.02$ ), GFI = 0.99, AGFI = 0.97, CFI = 0.98, NFI = 0.97, SRMR = 0.028, and RMSEA = 0.053. The standardized regression coefficients ranged from 0.16 to 0.70.

**Table 2** Correlations among PEDT items for healthy men and men with PE

Item	1	2	3	4	5	Total score PEDT
1	—	0.44	0.33	0.36	0.42	0.62
2	0.48	—	0.36	0.48	0.51	0.64
3	0.47	0.52	—	0.55	0.42	0.63
4	0.62	0.47	0.59	—	0.46	0.65
5	0.73	0.52	0.49	0.50	—	0.74
Total score	0.55	0.68	0.75	0.62	0.73	—

$P < 0.01$  for all values.

Correlations for men with PE are presented above the diagonal; correlations for healthy men are presented below the diagonal.



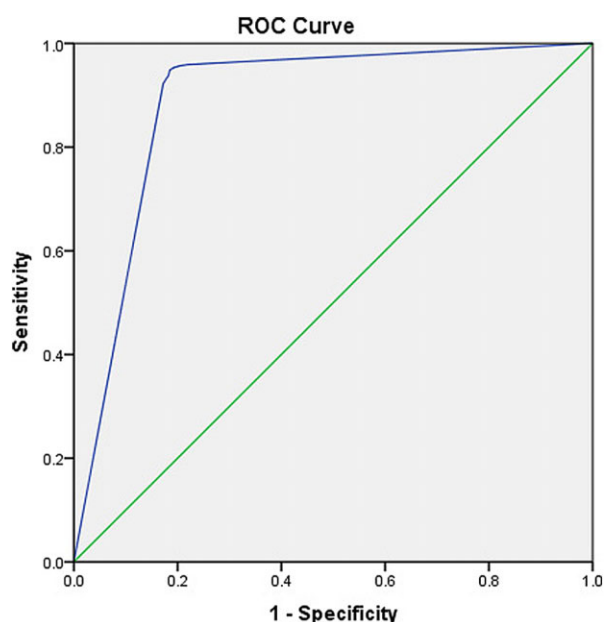
**Figure 1** Scatter plot of total PEDT scores vs. geometric mean IELT.  $r = -0.82$ ,  $P < 0.001$ .

CFA results for configural invariance of the PEDT were as follows:  $\chi^2 = 55.79$  ( $df = 19$ ,  $P = 0.02$ ), GFI = 0.88, CFI = 0.93, NFI = 0.92, SRMR = 0.048, RMSEA = 0.066. The fit indices assessing metric invariance further supported the fit of the model to the data:  $\chi^2 = 41.34$  ( $df = 15$ ,  $P = 0.02$ ), GFI = 0.91, CFI = 0.94, NFI = 0.92,

SRMR = 0.032, RMSEA = 0.074,  $\Delta CFI < 0.01$ . In summary, these results indicate that the PEDT items were understood and interpreted similarly in both cases and controls (Figure 3).

### Discussion

Developed by Symonds et al. based on the DSM-IV-TR defined criteria for the assessment of PE, the PEDT represents a quantitative measure for the assessment of PE that overcomes traditional limitations of previous measures [31]. Previous studies have repeatedly shown that each PE dimension is substantially influenced by cultural factors and that men's perceptions of PE differ significantly across different cultures. Therefore, cultural adaption of the measure and evaluation of cross-cultural applicability of the measure is crucial. The aim of the current study was to



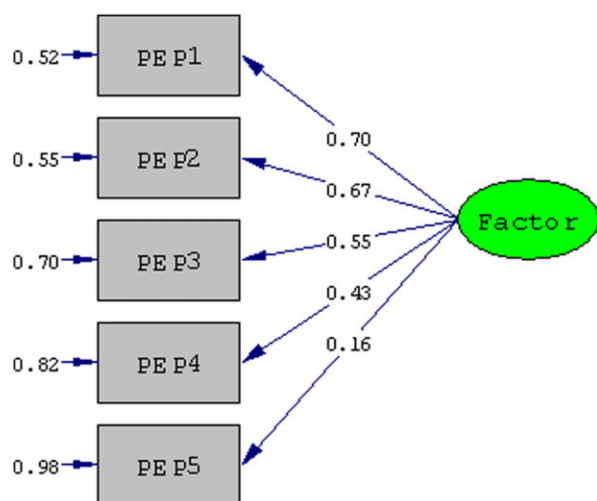
**Figure 2** Receiver operator characteristic curves for the PEDT (blue line) and the DSM-IV-TR definition of PE (green line). Diagonal segments are produced by ties.

**Table 3** Comparison of the PEDT item and total scores for men with and without PE

Item	Healthy men (n = 289)	Men with PE (n = 269)
1	1.13	3.18
2	1.46	3.14
3	1.03	3.00
4	1.15	3.05
5	1.12	3.30
Total score	6.67	16.73

All item scores and total score showed statistically significant differences according to male sexual health status (i.e., between men with and without PE), as determined using the Benjamini–Hochberg procedure.





**Figure 3** One-factor structure of the PEDT.  $\chi^2 = 12.86$  ( $df = 5$ ,  $P = 0.02475$ ), RMSEA = 0.053.

demonstrate the consistency and preservation of the psychometric properties of the translated and culturally adapted version of the PEDT for use in the Iranian male population.

Different diagnostic methods for the identification of PE exist, including objective outcome measures such as IELT [25] and self-report questionnaires such as the Premature Ejaculation Profile (PEP) [47], the Chinese Index of Premature Ejaculation (CIPE), the Index of Premature Ejaculation (IPE) [48], and the Clinical Global Impression of Change (CGIC) [49]. Among these assessment instruments, only the IELT and the CIPE have been proven to have good sensitivity and specificity profiles and are therefore able to differentiate between men with and without PE. There are, however, several limitations to these instruments. The CIPE, for example, is a measure primarily applied to monitor and assess the outcomes of pharmacological interventions and was not developed based on the DSM-IV-TR diagnostic criteria. Similarly, there are several shortcomings to IELT. First, a number of studies have indicated that the distribution of IELT data can potentially be skewed. Second, using a stopwatch during sexual intercourse interrupts the natural course of intimate activities and might cause annoyance and stress, thus aggravating any potentially existent PE and reducing sexual quality [50]. In addition to these limitations, the lack of consensus regarding the definition of PE is problematic for the use of both objective and subjective assessment methods [51]. Previous evidence has demonstrated that urologists' DSM-IV-TR-based

diagnosis can be subject to diagnostic errors, with reported risks of false negatives of up to 48%. This is most likely due to the subjective criteria (e.g., ejaculation before or shortly after vaginal penetration) included in the DSM-IV-TR diagnosis, which make accurate and uniform interpretation difficult [52]. Needless to say, there is a vital need to limit these diagnostic errors. Furthermore, to enhance successful epidemiologic research on PE, instruments developed on a sound scientific basis allowing accurate classification and uniform application of PE definitions, as well as consistent study designs providing meaningful end points and valid outcomes, are necessary and should be considered in all future research.

The internal consistencies for the current sample were very high, with  $\alpha > 0.70$  (0.89), indicating excellent internal consistency. This is higher than the internal consistencies reported by the original validation study of the PEDT on 309 men with PE, where the authors found a marginal threshold value of 0.71 for the five-item PEDT, while the overall Cronbach's alpha for the nine-item version was 0.86 [31]. Similarly, researchers validating the Turkish version of the PEDT ( $n = 94$  men with PE) reported considerably lower internal consistencies ( $r = 0.77$ ) compared with our study [26]. A potential explanation for these disparities may be that the estimation of Cronbach's alpha is affected by the sample size and number of items included in the scale (i.e., a nine-item PEDT version exists and has been used in some of these studies). We further report a highly significant test-retest reproducibility ( $r > 0.70$  for all ICCs), indicating excellent stability of the instrument. Again, this was considerably higher compared with the findings from the original validation study of the English version of the questionnaire (0.73), as well as the Korean (0.88) and Turkish (0.90) versions [24,26,31]. A potential explanation for these disparities may be the relatively young mean age of our sample compared with previous studies. Research has repeatedly shown that the prevalence of PE seems to be higher among older men compared with younger ones [53]. Therefore, younger men might be more stable in terms of their ejaculatory function and control compared to older men. This is somewhat supported by a study where test-retest reliability of the PEDT (ICC = 0.88) was higher in younger patients compared with older patients [32].

One-trait scaling analysis revealed high correlations of the PEDT items with total score on their own scale (all  $r > 0.60$ ). Furthermore, interitem

correlations indicated that all items were significantly correlated with each other. These findings confirm the convergent validity of the scale and suggest that all PEDT items are linearly correlated with the concept being measured (i.e., premature ejaculation). It should be noted, however, that the PEDT has only one scale, which renders comparison of the correlations between items and with other scales impossible. Because of this, we used known-group analyses to assess the discriminant validity of the scale (i.e., healthy men vs. men with PE). Men with PE scored lower compared with healthy men on all PEDT items, as well as on the total score. This trend remained significant even when *P* values were adjusted for multiple comparisons, therefore supporting the hypothesis that the PEDT is able to discriminate between men with and without PE. Overall, our findings were similar to the findings from validation studies conducted in the United States and Korea [24,31].

Symonds et al. demonstrated that a score  $\geq 9$  for the PEDT [31] was the best differentiation cutoff between men with and without PE. In the present study, the optimal cutoff value of PEDT for a PE diagnosis was 9.1, with a sensitivity of 92% and a specificity of 83%. Therefore, the results of the study support a similar scoring system for the Persian version. Furthermore, these results indicate that the PEDT has a diagnostic accuracy that is comparable with that of IELT for screening men with unknown sexual health status in clinics and other medical settings.

Convergent validity of the PEDT was examined by exploring the correlations between IELT and PEDT outcomes. The results revealed that the PEDT total score correlated negatively with mean IELT. Again, our findings were in line with the results from previous studies [24,26].

The EFA revealed a unidimensional factor structure for the Iranian version of the PEDT. With regard to construct validity, we were successful in replicating the single-factor structure of the original English PEDT with moderate to high standardized factor loadings ( $P < 0.05$ ) for all items except item 5, thus supporting the factorial validity of the instrument in our Iranian sample [24,31].

In the present study, the measurement invariance of the five items of the PEDT was evaluated to ensure that the tool yielded the same underlying construct across men with different sexual health statuses (i.e., with and without PE). Our results revealed that there were no significant differences in item location between men with and without PE, suggesting stability of the item loca-

tions when the instrument is used for screening purposes (i.e., in the general population). In other words, both men with PE and those without PE perceived the PEDT items similarly.

As in all studies, there were several potential limitations to the research design. First, the sample size was relatively small, thus limiting the generalizability of the results. Second, the participants included in this study were relatively young (mean ages of 35.3 years in the case group and 34.9 years in the control group), and therefore extrapolation of the findings to other age groups or populations can only be limited. Future studies should investigate the invariance of the PEDT in men across different age clusters, different ethnicities, and different stages of PE using longitudinal approaches and larger samples. Finally, the strong correlation between IELT and the PEDT demonstrates that these two tools may measure the same thing. Thus, there is a lack of evidence for the divergent validity of the PEDT in this specific population. Therefore, further research is needed to explore the correlation between the PEDT and self-reported IELT.

## Conclusion

In conclusion, the translated and culturally adapted Iranian version of the PEDT demonstrates high internal reliability and good construct validity and can be applied as an assessment tool for erectile function across Iranian men with and without PE. The PEDT will be especially useful where cultural barriers may hinder the use of other assessment instruments, such as IELT.

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